What is claimed is:

1. A power supply antenna comprising a plurality of coils disposed concentrically, the plurality of coils being prepared by bending a plurality of conductors each into a form of an arc, and wherein

power supply portions formed at opposite ends of the respective coils so as to be connected to a high frequency power source are located in different phases on a same plane.

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2. A power supply antenna comprising a plurality of coils disposed concentrically, the plurality of coils being prepared by bending a plurality of conductors each into a form of an arc, and wherein

power supply portions formed at opposite ends of the respective coils so as to be connected to a high frequency power source are located in different phases on a same plane, and

radii or thicknesses of the respective coils are adjusted to vary self inductances and mutual inductances, thereby varying electric currents flowing through the respective coils so that a distribution of energy absorbed to a plasma can be adjusted.

3. A power supply antenna comprising a plurality of coils disposed concentrically, the plurality of coils

being prepared by bending a plurality of conductors each into a form of an arc, and wherein

power supply portions formed at opposite ends of the respective coils so as to be connected to a high frequency power source are located in different phases on a same plane, and

at least one of the coils is disposed on a plane other than the same plane to vary mutual inductances so that a distribution of energy absorbed to a plasma is adjusted.

4. A power supply antenna comprising a plurality of coils disposed concentrically, the plurality of coils being prepared by bending a plurality of conductors each into a form of an arc, and wherein

power supply portions formed at opposite ends of the respective coils so as to be connected to a high frequency power source are located in different phases on a same plane, and

spacing between the adjacent power supply portions in the respective coils is equal.

5. A power supply apparatus comprising:

a power supply antenna comprising a plurality of coils disposed concentrically, the plurality of coils being prepared by bending a plurality of conductors each into a form of an arc; and

matching means having capacitors connected in parallel to the respective coils of the power supply antenna, and wherein

the matching means has

a first tubular capacitor and a second tubular capacitor each having electrodes at axially opposite ends thereof, and also has

a first electrode, a second electrode and a third electrode disposed parallel to the power supply antenna, with electrical insulation being established with respect to each other,

one of the electrodes of the first capacitor being connected to the first electrode, one of the electrodes of the second capacitor being connected to the second electrode, and the other electrodes of the first and second capacitors being connected to the third electrode.

6. A power supply apparatus comprising:

a power supply antenna comprising a plurality of coils disposed concentrically, the plurality of coils being prepared by bending a plurality of conductors each into a form of an arc; and

matching means having capacitors connected in parallel to the respective coils of the power supply antenna, and wherein

the matching means has

a first tubular capacitor and a second tubular capacitor each having electrodes at axially opposite ends thereof, and also has

a first electrode, a second electrode and a third electrode disposed parallel to the power supply antenna, with electrical insulation being established with respect to each other,

one of the electrodes of the first capacitor being connected to the first electrode, one of the electrodes of the second capacitor being connected to the second electrode, and the other electrodes of the first and second capacitors being connected to the third electrode,

the first electrode and the third electrode are disposed at opposite ends thereof,

the second electrode comprising a flat plate portion having through-holes and a concave portion protruding from the flat plate portion toward the first electrode is disposed between the first electrode and the third electrode,

the first capacitor passes through the through-hole and has one of the electrodes thereof connected to the first electrode,

the second capacitor fits into the concave portion and has one of the electrodes thereof connected to the second electrode, and

at least one of power supply portions of each

of the coils constituting the power supply antenna passes through at least the first electrode and establishes an electrically connected relationship with the second electrode.

7. The power supply apparatus of claim 5 or 6, wherein

the power supply antenna comprises a plurality of coils disposed concentrically, the plurality of coils being prepared by bending a plurality of conductors each into a form of an arc, and

power supply portions formed at opposite ends of the respective coils so as to be connected to a high frequency power source are located in different phases on a same plane.

8. The power supply apparatus of claim 5 or 6, wherein

the power supply antenna comprises a plurality of coils disposed concentrically, the plurality of coils being prepared by bending a plurality of conductors each into a form of an arc,

power supply portions formed at opposite ends of the respective coils so as to be connected to a high frequency power source are located in different phases on a same plane, and

radii or thicknesses of the respective coils are

adjusted to vary self inductances and mutual inductances, thereby varying electric currents flowing through the respective coils so that a distribution of energy absorbed to a plasma can be adjusted.

9. The power supply apparatus of claim 5 or 6, wherein

the power supply antenna comprises a plurality of coils disposed concentrically, the plurality of coils being prepared by bending a plurality of conductors each into a form of an arc,

power supply portions formed at opposite ends of the respective coils so as to be connected to a high frequency power source are located in different phases on a same plane, and

at least one of the coils is disposed on a plane other than the same plane to vary mutual inductances so that a distribution of energy absorbed to a plasma is adjusted.

10. The power supply apparatus of claim 5 or 6, wherein

the power supply antenna comprises a plurality of coils disposed concentrically, the plurality of coils being prepared by bending a plurality of conductors each into a form of an arc,

power supply portions formed at opposite ends

of the respective coils so as to be connected to a high frequency power source are located in different phases on a same plane, and

spacing between the adjacent power supply portions in the respective coils is equal.

11. A semiconductor manufacturing apparatus comprising:

a vessel having an electromagnetic wave transparent window;

a power supply antenna provided outside the vessel and opposed to the electromagnetic wave transparent window; and

a power source for applying a high frequency voltage to the power supply antenna, and

being adapted to apply the high frequency voltage from the power source to the power supply antenna to generate an electromagnetic wave, and pass the electromagnetic wave through the electromagnetic wave transparent window into the vessel to generate a plasma, thereby treating a surface of a substrate in the vessel, wherein

the power supply antenna comprises a plurality of coils disposed concentrically, the plurality of coils being prepared by bending a plurality of conductors each into a form of an arc, and is configured such that power supply portions formed at opposite ends of the

respective coils so as to be connected to the power source are located in different phases on a same plane.

12. A semiconductor manufacturing apparatus comprising:

a vessel having an electromagnetic wave transparent window;

a power supply antenna provided outside the vessel and opposed to the electromagnetic wave transparent window; and

a power source for applying a high frequency voltage to the power supply antenna, and

being adapted to apply the high frequency voltage from the power source to the power supply antenna to generate an electromagnetic wave, and pass the electromagnetic wave through the electromagnetic wave transparent window into the vessel to generate a plasma, thereby treating a surface of a substrate in the vessel, and further including

a power supply apparatus comprising:

the power supply antenna comprising a plurality of coils disposed concentrically, the plurality of coils being prepared by bending a plurality of conductors each into a form of an arc; and

matching means having capacitors connected in parallel to the respective coils of the power supply antenna, and configured such that

the matching means has

a first tubular capacitor and a second tubular capacitor each having electrodes at axially opposite ends thereof, and also has

a first electrode, a second electrode and a third electrode disposed parallel to the power supply antenna, with electrical insulation being established with respect to each other,

one of the electrodes of the first capacitor being connected to the first electrode, one of the electrodes of the second capacitor being connected to the second electrode, and the other electrodes of the first and second capacitors being connected to the third electrode.

13. A power supply method for a power supply antenna comprising a plurality of coils disposed concentrically, the plurality of coils being prepared by bending a plurality of conductors each into a form of an arc, and being configured such that power supply portions formed at opposite ends of the respective coils so as to be connected to a high frequency power source are located in different phases on a same plane, wherein

a frequency of a high frequency voltage applied to the coil on an outermost periphery of the power supply antenna is made relatively lower than a frequency of a high frequency voltage applied to the other coil,

whereby heating of a plasma directly below the coil on the outermost periphery is promoted.

14. A power supply method for a power supply apparatus comprising:

a power supply antenna comprising a plurality of coils disposed concentrically, the plurality of coils being prepared by bending a plurality of conductors each into a form of an arc; and

matching means having capacitors connected in parallel to the respective coils of the power supply antenna, and configured such that the matching means has

a first tubular capacitor and a second tubular capacitor each having electrodes at axially opposite ends thereof, and also has

a first electrode, a second electrode and a third electrode disposed parallel to the power supply antenna, with electrical insulation being established with respect to each other,

one of the electrodes of the first capacitor being connected to the first electrode, one of the electrodes of the second capacitor being connected to the second electrode, and the other electrodes of the first and second capacitors being connected to the third electrode, wherein

a frequency of a high frequency voltage applied to the coil on an outermost periphery of the power supply

antenna is made relatively lower than a frequency of a high frequency voltage applied to the other coil, whereby heating of a plasma directly below the coil on the outermost periphery is promoted.

15. A power supply method for a semiconductor manufacturing apparatus adapted to apply a high frequency voltage to a power supply antenna to generate an electromagnetic wave, and pass the electromagnetic wave through an electromagnetic wave transparent window into a vessel to generate a plasma, thereby treating a surface of a substrate in the vessel, the power supply antenna comprising a plurality of coils disposed concentrically, the plurality of coils being prepared by bending a plurality of conductors each into a form of an arc, wherein

a frequency of the high frequency voltage applied to the coil on an outermost periphery of the power supply antenna is made relatively lower than a frequency of the high frequency voltage applied to the other coil, whereby heating of a plasma directly below the coil on the outermost periphery is promoted.

16. The power supply apparatus of claim 5 or 6, including

a plurality of types of power sources for supplying high frequency voltages of different

frequencies, and wherein

the high frequency power source for an output voltage of the lowest frequency is connected to the coil on an outermost periphery, and

the high frequency power source for an output voltage of a relatively high frequency is connected to the other coil.

17. The semiconductor manufacturing apparatus of claim 12, including

a plurality of types of power sources for supplying high frequency voltages of different frequencies, and wherein

the high frequency power source for an output voltage of the lowest frequency is connected to the coil on an outermost periphery, and

the high frequency power source for an output voltage of a relatively high frequency is connected to the other coil.